Appendix C: Reference Standards and Data for Water

Table C.1. Reference standards for radionuclides in water (pCi/L)

Parameter[a]	National primary drinking water standard[b]	4% of DCG[c]	DCG[d]
^{241}Am		1.2	30
^{214}Bi		24,000	600,000
^{109}Cd		400	10,000
^{143}Ce		1,200	30,000
^{60}Co		200	5,000
^{51}Cr		40,000	1,000,000
^{137}Cs		120	3,000
^{155}Eu		4,000	100,000
Gross alpha[e]	15		
Gross beta (mrem/year)	4[f]		
^{3}H	20,000[g]	80,000	2,000,000
^{131}I		120	3,000
^{40}K		280	7,000
^{237}Np		1.2	30
^{234m}Pa		2,800	70,000
^{238}Pu		1.6	40
$^{239/240}$Pu		1.2	30
^{226}Ra	5[h]	4	100
^{228}Ra	5[h]	4	100
^{106}Ru		240	6,000
^{90}Sr	8[g]	40	1,000
^{99}Tc		4,000	100,000
^{228}Th		16	400
^{230}Th		12	300
^{232}Th		2	50
^{234}Th		400	10,000
Thorium, natural		2	50
^{234}U		20	500
^{235}U		24	600
^{236}U		20	500
^{238}U		24	600
Uranium, natural		24	600
Uranium, total[i]	30 μg/L[j]	20	500

[a]Only the radionuclides included in the Oak Ridge Reservation monitoring programs are listed.

[b]40 CFR Part 141 National Primary Drinking Water Regulations Subparts B and G.

[c]Four percent of the derived concentration guide represents the DOE criterion of 4 mrem effective dose equivalent from ingestion of drinking water.

[d]U.S. DOE Order 5400.5 Chapter III, "Derived Concentration Guides for Air and Water."

[e]Excludes radon and uranium.

[f]Per the discussion in 40 CFR 141.26(b), compliance with the 4 mrem/year standard can be assumed if the average annual gross beta particle activity is less than 50 pCi/L and if the average annual concentrations of ^{3}H and ^{90}Sr are less than 20,000 pCi/L and 8 pCi/L, respectively, provided that, if both radionuclides are present, the sum of their annual dose equivalents to bone marrow is less than 4 mrem/year. In the text of this document, 50 pCi/L is referred to as the "screening level."

[g]These values are not maximum contaminant levels (MCLs), but are concentrations that result in the effective dose equivalent of the MCL for gross beta emissions, which is 4 mrem/year.

[h]Applies to combined ^{226}Ra and ^{228}Ra.

[i]Minimum of uranium isotopes.

[j]Effective December 8, 2003.

Table C.2. Reference standards for chemicals and metals in water

Parameter	National drinking water standards		Tennessee water quality criteria[c]			
	Primary[a]	Secondary[b]	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms[d]
Anions (mg/L)						
Chloride		250				
Fluoride	4	2				
Nitrate	10					
Nitrite	1					
Sulfate, as SO_4		250				
Base/neutral/acid extractable organics (µg/L)						
1,2-Dichlorobenzene (*ortho*)	600		600		17,000	2,700
1,2-Diphenylhydrazine					5.4	0.4
1,2,4-Trichlorobenzene	70		70			
1,3-Dichlorobenzene (*meta*)					2,600	400
1,4-Dichlorobenzene (*para*)	75		75		2,600	400
2,4-Dichlorophenol					790	93
2,4-Dimethylphenol					2,300	540
2,4-Dinitrophenol					14,000	70
2,4-Dinitrotoluene					91	1.1
2,4,6-Trichlorophenol					65	21
2-Chlorophenol					400	120
2-Chloronaphthalene					4,300	1,700
2-Methyl-4,6-Dinitrophenol					765	13.4
3,3-Dichlorobenzidine					0.77	0.4
3,4-Benzo(b)fluoranthene					0.49	0.044
Benzo(k)fluoranthene					0.49	0.044
Acenaphthylene					2,700	1,200
Anthracene					110,000	9,600
Benzidine					0.0054	0.0012
Benzo(a)anthracene					0.49	0.044
Benzo(a)pyrene	0.2		0.2		0.49	0.044
bis-(2-chloroethyl)ether					14	0.31
bis-(2-Chloro-isopropyl)ether					170,000	1,400
bis-(2-ethylhexyl)phthalate	6		6		59	18
Butylbenzyl phthalate					5,200	3,000
Chrysene					0.49	0.044
Di-n-butyl phthalate					12,000	2,700
Dibenz(a,h)anthracene					0.49	0.044
Diethyl phthalate					120,000	23,000
Dimethyl phthalate					2,900,000	313,000
Fluoranthene					370	300
Fluorene					14,000	1,300
Hexachlorobenzene	1		1		0.0077	0.0075
Hexachlorobutadiene					500	4.4
Hexachlorocyclopentadiene	50		50		17,000	240
Hexachloroethane					89	19
Ideno(1,2,3-cd)pyrene					0.49	0.044
Isophorone					26,000	360
N-Nitrosodimethylamine					81	0.0069
N-Nitrosodi-n-propylamine					1.4	0.005
N-Nitrosodiphenylamine					160	50

Table C.2. (continued)

Parameter	National drinking water standards		Tennessee water quality criteria[c]			
	Primary[a]	Secondary[b]	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms[d]
Nitrobenzene					1,900	17
Pentachlorophenol (pH 7.8)	1		1	20	82	2.8
Phenol					4,600,000	21,000
Pyrene					11,000	960
Field measurements						
Chlorine, (TRC), µg/L				19		
Dissolved oxygen, mg/L				5		
Temperature, °C			30.5	30.5	30.5	30.5
Turbidity, JTU[e]	1					
pH, standard units		(6.5, 8.5)	(6.0, 9.0)	(6.5, 9.0)	(6.0, 9.0)	(6.0, 9.0)
Metals (mg/L)						
Aluminum		0.05-0.2				
Antimony	0.006		0.006		4.30	0.014
Arsenic	0.01[f]		0.050	0.360 (III)	0.050	0.050
Barium	2		2			
Beryllium	0.004		0.004			
Cadmium	0.005		0.005	0.0039[g]		
Chromium, total	0.1		0.1			
Chromium (hexavalent)				0.016		
Copper	1.3[h]	1		0.0177[g]		
Iron		0.3				
Lead	0.015[h]		0.005	0.0817[g]		
Manganese		0.05				
Mercury	0.002		0.002	0.00169	0.000051	0.00005
Nickel			0.1	1.418[g]	4.6	0.61
Selenium	0.05		0.050	0.02		
Silver		0.1		0.0041[g]		
Thallium	0.002		0.002		0.0063	0.0017
Zinc		5		0.117[g]		
Others						
Asbestos (fibers/L)	7,000,000					
Chlorine (TRC)				0.019		
Coliform bacteria (no./100 mL, geometric mean			1,000	1,000	200	200
Coliform bacteria (no./100 mL, individual sample			5,000	5,000	1,000	1,000
Color (color units)		15				
Cyanide (mg/L)	0.2		0.2	0.022	220	0.7
E. coli (no./100 mL, geometric mean)					126	126
Odor (threshold odor number)		3				
Total dissolved solids (mg/L)		500	500			
Pesticides/herbicides/PCBs (µg/L)						
2,3,7,8-TCDD (Dioxin)	0.00003		0.00003		0.000001	0.000001
2,4-D	70		70			
2,4,5-TP (Silvex)	50		50			
4,4′-DDT				1.1	0.0059	0.0059
4,4′-DDE					0.0059	0.0059

Table C.2 (continued)

Parameter	National drinking water standards		Tennessee water quality criteria[c]			
	Primary[a]	Secondary[b]	Domestic water supply	Fish and aquatic life CMC	Recreation	
					Organisms	Water and organisms[d]
4,4′-DDD					0.0084	0.0083
a-BHC					0.13	0.039
b-BHC					0.46	0.14
Alachlor	2		2			
Aldicarb	3					
Aldicarb sulfoxide	4					
Aldicarb sulfone	2					
Aldrin				3.0	0.0014	0.0013
Atrazine	3		3			
Carbofuran	40		40			
Chlordane	2		2	2.4	0.0059	0.0057
Dalapon	200		200			
1,2-Dibromo-3-chloropropane	0.2		0.2			
Di(ethylhexyl)adipate	400		400			
Dieldrin				2.5	0.0014	0.0014
Di(ethylhexyl)phthalate[i]						
Dinoseb	7		7			
Diquat	20		20			
a-Endosulfan				0.22	240	110
b-Endosulfan				0.22	240	110
Endosulfan sulfate					240	110
Endothall	100		100			
Endrin	2		2	0.18	0.81	0.76
Endrin aldehyde					0.81	0.76
Ethylene dibromide	0.05		0.05			
Glyphosate	700		700			
Heptachlor	0.4		0.4	0.52	0.0021	0.0021
Heptachlor epoxide	0.2		0.2	0.52	0.0011	0.001
g-BHC (Lindane)	0.2		0.2	2.0	0.63	0.19
Methoxychlor	40		40			
Oxamyl (Vydate)	200		200			
PCB-1242					0.00045	0.00044
PCB-1254					0.00045	0.00044
PCB-1221					0.00045	0.00044
PCB-1232					0.00045	0.00044
PCB-1248					0.00045	0.00044
PCB-1260					0.00045	0.00044
PCB-1016					0.00045	0.00044
PCB, total	0.5		0.5		0.00045	0.00044
Picloram	500		500			
Simazine	4		4			
Toxaphene	3		3	0.73	0.0075	0.0073
Volatile organics (µg/L)						
1,1,1-Trichloroethane	200		200			
1,1-Dichloroethene	7		7		32	0.57
1,1,2-Trichloroethane	5		5		420	6
1,1,2,2-Tetrachloroethane					110	1.7
1,2-Dichloroethane	5		5		990	3.8
1,2-Dichloroethene[j]						

Table C.2 (continued)

Parameter	National drinking water standards		Tennessee water quality criteria[c]			
			Domestic water supply	Fish and aquatic life CMC	Recreation	
	Primary[a]	Secondary[b]			Organisms	Water and organisms[d]
cis-1,2-Dichloroethene	70		70			
trans-1,2-Dichloroethene	100		100		140,000	700
1,2-Dichloropropane	5		5		39	0.52
cis-1,3-Dichloropropene					1,700	10
trans-1,3-Dichloropropene					1,700	10
Acrolein					780	320
Acrylonitrile					6.6	0.59
Benzene	5		5		710	12
Bromodichloromethane	100[k]				460	5.6
Bromoform	100[k]				3,600	43
Carbon tetrachloride	5		5		44	2.5
Chlorobenzene	100		100		21,000	680
Chloroform	100[l]				4,700	57
Dibromochloromethane	100[l]				340	4.1
Ethylbenzene	700		700		29,000	3,100
Methylbromide					4,000	48
Methylene chloride (Dichloromethane)	5		5		16,000	47
Styrene	100		100			
Tetrachloroethene	5		5		88.5	8
Toluene	1,000		1,000		200,000	6,800
Trichloroethene	5		5		810	27
Trihalomethanes, total	100[k]					
Vinyl chloride	2		2		5,250	20
Xylene, total	10,000		10,000			

[a]40 CFR Part 141—National Primary Drinking Water Regulations, Subparts B and G, as amended.

[b]40 CFR Part 143—National Secondary Drinking Water Regulations, as amended.

[c]Rules of Tennessee Department of Environment and Conservation, Division of Water Pollution Control, Chapter 1200-4-3, General Water Quality Criteria, as amended. CMC = criterion maximum concentration.

[d]These criteria, for the protection of public health, pertain to the consumption of water and organisms. They are applied only to waters designated for *both* recreation and domestic water supply.

[e]Jackson turbidity unit (JTU) and nephelometric turbidity unit (NTU) are roughly equivalent in the range of 25 to 1000 JTU.

[f]As of January 23, 2006.

[g]The standard is a function of total hardness. The values in this table correspond to a total-hardness value of 100 mg/L.

[h]"Action level" for initiation of corrosion control studies and treatment techniques, applicable to community water systems and nontransient, noncommunity water systems.

[i]See bis(2-ethylhexyl)phthalate.

[j]See *cis*-1,2-Dichlorethene and *trans*-1,2-Dichloroethene.

[k]Limit for total trihalomethanes (bromodichloromethane + bromoform + chloroform + dibromochloromethane).

Table C.3. Surface water analyses (2002) at Environmental Monitoring Plan surface water locations[a]

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
First Creek just upstream of Northwest Tributary (1STCK)						
Field measurements						
Dissolved oxygen (ppm)	2/2	9.0	7.8	8.4	0.60	*f*
pH (SU)	2/2	7.0	6.9	*f*	*f*	*f*
Temperature (°C)	2/2	17	15	16	0.85	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	2/2	19*	7.3*	13	5.9	*f*
Gross beta	2/2	170*	83*	130	44	*f*
^{40}K	1/2	41*	29	35	6.0	280
Total rad Sr	2/2	82*	39*	61	22	40
Total uranium	1/1	14*	14*	14	*f*	20
$^{233/234}$U	2/2	13*	4.5*	8.8	4.3	*f*
^{238}U	2/2	0.66*	0.24*	0.45	0.21	24
Bear Creek downstream from Y-12 Complex inputs (BCK 0.6)						
Field measurements						
Dissolved oxygen (ppm)	2/2	9.4	6.8	8.1	1.3	*f*
pH (SU)	2/2	7.9	7.5	*f*	*f*	*f*
Temperature (°C)	2/2	18	15	16	1.5	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	2/2	8.9*	7.1*	8.0*	0.90	*f*
Gross beta	2/2	11*	11*	11	0	*f*
^{40}K	1/2	27*	–17	5.0	22	280
Total uranium	1/1	11*	11*	11	*f*	20
^{234}U	2/2	3.9*	2.5*	3.2	0.70	20
^{235}U	1/2	0.21*	0.083	0.15	0.064	24
^{238}U	2/2	6.9*	4.0*	5.5	1.5	24
Clinch River downstream from all DOE ORR inputs (CRK 16)						
Field measurements						
Dissolved oxygen (ppm)	12/12	12	5.9	8.3	0.50	*f*
pH (SU)	12/12	8.4	6.4	*f*	*f*	*f*
Temperature (°C)	12/12	24	7.5	16	1.8	*f*
Metals (mg/L)						
Aluminum, total	12/12	1.0	0.32	0.61	0.070	*f*
Barium, total	12/12	0.048	0.034	0.040	0.0012	*f*
Calcium, total	12/12	39	29	36	0.79	*f*
Iron, total	12/12	0.83	0.26	0.47	0.055	*f*
Magnesium, total	12/12	12	9.0	10	0.21	*f*
Manganese, total	12/12	0.14	0.027	0.064	0.0089	*f*
Potassium, total	3/12	2.2	<2.0	~2.0	0.022	*f*
Sodium, total	12/12	7.3	5.1	6.4	0.21	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	3/12	1.9*	–2.6	0.58*	0.32	*f*
Gross beta	6/12	41*	–0.44	6.2*	3.3	*f*
^{40}K	3/12	63*	–24	15*	6.9	280
pH	12/12	8.4	6.0	*f*	*f*	*f*
Temperature (°C)	12/12	23	8.3	16	1.6	*f*

Table C.3 (continued)

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
Radionuclides (pCi/L)[g]						
Gross beta	5/12	20*	0.050	4.2*	1.6	*f*
^{3}H	4/12	880*	–150	190*	74	80,000
^{40}K	4/12	270*	–32	40	28	280
Total rad Sr	2/12	7.0*	–4.5	0.94	0.82	40
Clinch River downstream from ORNL (CRK 32)						
Field measurements						
Dissolved oxygen (ppm)	12/12	11	5.6	8.1	0.50	*f*
pH (SU)	12/12	8.9	6.3	*f*	*f*	*f*
Temperature (°C)	12/12	22	7.9	16	1.6	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	3/12	2.5*	–2.2	0.59	0.34	*f*
Gross beta	5/12	7.7*	–1.1	3.0*	0.64	*f*
^{3}H	6/12	550*	65	270*	49	80,000
^{40}K	2/12	39*	–53	5.0	7.8	280
Water supply intake for Knox County (CRK 58)						
Field measurements						
Dissolved oxygen (ppm)	12/12	11	7.1	9.0	0.34	*f*
pH (SU)	12/12	9.0	6.4	*f*	*f*	*f*
Temperature (°C)	12/12	28	7.9	17	2.0	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	3/12	6.5*	–0.062	0.96*	0.51	*f*
Gross beta	2/12	4.5*	–1.1	1.6*	0.46	*f*
^{40}K	7/12	260*	–42	53*	27	280
Melton Hill Reservoir above city of Oak Ridge water intake (CRK 66)						
Field measurements						
Dissolved oxygen (ppm)	12/12	12	6.8	9.2	0.50	*f*
pH (SU)	12/12	8.9	6.4	*f*	*f*	*f*
Temperature (°C)	12/12	27	6.6	17	1.9	*f*
Radionuclides (pCi/L)[g]						
Gross beta	1/12	4.4*	–27	–0.61	2.4	*f*
^{40}K	2/12	240*	–22	33	20	280
Clinch River (Solway Bridge) upstream from all DOE inputs (CRK 70)						
Field measurements						
Dissolved oxygen (ppm)	12/12	11	6.3	8.1	0.44	*f*
pH (SU)	12/12	8.8	6.2	*f*	*f*	*f*
Temperature (°C)	12/12	28	8.3	17	1.7	*f*
Metals (mg/L)						
Aluminum, total	10/12	1.2	<0.20	~0.43	0.080	*f*
Barium, total	12/12	0.041	0.034	0.037	0.00064	*f*
Calcium, total	12/12	40	34	37	0.55	*f*
Iron, total	12/12	0.81	0.11	0.34	0.057	*f*
Magnesium, total	12/12	12	9.7	11	0.23	*f*
Manganese, total	12/12	0.13	0.029	0.062	0.0079	*f*
Potassium, total	3/12	2.1	<2.0	~2.0	0.012	*f*
Sodium, total	12/12	9.4	5.7	7.1	0.33	*f*
Zinc, total	1/12	0.19	<0.050	~0.062	0.012	*f*

Table C.3 (continued)

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
Radionuclides (pCi/L)[g]						
Gross alpha	1/12	1.5	–0.028	0.57*	0.15	*f*
Gross beta	2/12	5.0*	–33	–1.4	2.9	*f*
^{40}K	3/12	300*	–59	40	32	280
East Fork Polpar Creek prior to entering Poplar Creek (EFK 0.1)						
Field measurements						
Dissolved oxygen (ppm)	2/2	7.4	4.8	6.1	1.3	*f*
pH (SU)	2/2	7.8	7.4	*f*	*f*	*f*
Temperature (°C)	2/2	20	16	18	2.0	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	3.3*	–1.1	1.1	2.2	*f*
Gross beta	2/2	6.3*	3.6*	5.0	1.4	*f*
^{40}K	1/2	31*	–18	6.5	25	280
^{234}U	1/1	1.1*	1.1*	1.1	*f*	20
^{235}U	1/1	0.18*	0.18*	0.18	*f*	24
^{238}U	1/1	2.3*	2.3*	2.3	*f*	24
East Fork Poplar Creek downstream from floodplain (EFK 5.4)						
Field measurements						
Dissolved oxygen (ppm)	2/2	8.0	7.4	7.7	0.30	*f*
pH (SU)	2/2	7.8	7.5	*f*	*f*	*f*
Temperature (°C)	2/2	20	16	18	1.7	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	2.6*	–1.2	0.70	1.9	*f*
Gross beta	1/2	4.8*	2.7	3.8	1.1	*f*
^{40}K	1/2	290*	–22	130	160	280
Fifth Creek just upstream of White Oak Creek at ORNL (FIFTHCK 0.1)						
Field measurements						
Dissolved oxygen (ppm)	2/2	9.5	8.0	8.8	0.75	*f*
pH (SU)	2/2	7.0	6.8	*f*	*f*	*f*
Temperature (°C)	2/2	19	17	18	1.2	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	2/2	2.4*	2.1*	2.3*	0.15	*f*
Gross beta	2/2	27*	19*	23	4.0	*f*
^{3}H	2/2	400*	340*	370*	30	80,000
Total rad Sr	2/2	21*	11*	16	5.0	40
Grassy Creek upstream of SEG and IT Corp. at CRK 23 (GCK 3.6)						
Field measurements						
Dissolved oxygen (ppm)	2/2	11	6.9	9.0	2.1	*f*
pH (SU)	2/2	7.8	7.2	*f*	*f*	*f*
Temperature (°C)	2/2	18	13	16	2.7	*f*
Metals (mg/L)						
Aluminum, total	2/2	3.2	1.9	2.5	0.65	*f*
Barium, total	2/2	0.079	0.060	0.070	0.0098	*f*
Calcium, total	2/2	42	26	34	7.8	*f*
Iron, total	2/2	2.1	1.3	1.7	0.41	*f*
Magnesium, total	2/2	5.0	4.3	4.6	0.36	*f*
Manganese, total	2/2	0.37	0.18	0.28	0.093	*f*
Potassium, total	1/2	2.0	<2.0	~2.0	0.010	*f*
Sodium, total	2/2	6.0	5.0	5.5	0.47	*f*

Table C.3 (continued)

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
Radionuclides (pCi/L)[g]						
Gross beta	1/2	5.2*	1.2	3.2	2.0	*f*
^{40}K	1/2	47*	8.9	28	19	280
Ish Creek prior to entering CRK 30.8 (ICK 0.7)						
Field measurements						
Dissolved oxygen (ppm)	2/2	8.7	7.7	8.2	0.50	*f*
pH (SU)	2/2	7.8	7.4	*f*	*f*	*f*
Temperature (°C)	2/2	18	14	16	1.9	*f*
Radionuclides (pCi/L)[g]						
^{40}K	1/2	280*	27	150	130	280
McCoy Branch prior to entering CRK 60.3 (MCCBK 1.8)						
Field measurements						
Dissolved oxygen (ppm)	2/2	8.1	6.5	7.3	0.80	*f*
pH (SU)	2/2	6.8	6.6	*f*	*f*	*f*
Temperature (°C)	2/2	24	13	18	5.3	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	2.2*	0.84	1.5	0.68	*f*
Gross beta	2/2	5.1*	4.7*	4.9*	0.20	*f*
Melton Branch downstream from ORNL (MEK 0.2)						
Field measurements						
Dissolved oxygen (ppm)	6/6	13	5.4	8.8	1.1	*f*
pH (SU)	6/6	8.6	6.4	*f*	*f*	*f*
Temperature (°C)	6/6	22	3.6	14	3.2	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/6	4.2	–0.54	1.9*	0.63	*f*
Gross beta	6/6	670*	220*	500*	68	*f*
^{3}H	6/6	530,000*	37,000*	280,000*	65,000	80,000
^{40}K	1/6	41*	–5.3	13*	6.5	280
Total rad Sr	6/6	310*	97*	220*	31	40
Total uranium	1/1	1.2*	1.2*	1.2	*f*	20
^{234}U	2/2	0.36*	0.26*	0.31	0.050	20
^{238}U	2/2	0.76*	0.22*	0.49	0.27	24
Northwest Tributary prior to entering 1st Creek at ORNL (NWTK 0.1)						
Field measurements						
Dissolved oxygen (ppm)	2/2	8.5	8.1	8.3	0.20	*f*
pH (SU)	2/2	7.0	6.9	*f*	*f*	*f*
Temperature (°C)	2/2	17	15	16	1.3	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	5.5*	0.72	3.1	2.4	*f*
Gross beta	2/2	150*	71*	110	40	*f*
Total rad Sr	2/2	74*	42*	58	16	40
^{234}U	1/1	0.41*	0.41*	0.41	*f*	20
^{238}U	1/1	0.13*	0.13*	0.13	*f*	24
Raccoon Creek sampling station prior to entering CRK 31 (RCK 2.0)						
Field measurements						
Dissolved oxygen (ppm)	2/2	7.0	4.6	5.8	1.2	*f*
pH (SU)	2/2	7.6	7.1	*f*	*f*	*f*
Temperature (°C)	2/2	16	14	15	1.2	*f*

Table C.3 (continued)

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	1.5*	0.97	1.2	0.27	*f*
Gross beta	2/2	11*	9.8*	10*	0.60	*f*
^{40}K	1/2	250*	16	130	120	280
Total rad Sr	2/2	15*	3.7*	9.4	5.7	40
Walker Branch prior to entering CRK 53.4 (WBK 0.1)						
Field measurements						
Dissolved oxygen (ppm)	2/2	7.7	6.0	6.9	0.85	*f*
pH	2/2	6.9	6.6	*f*	*f*	*f*
Temperature (°C)	2/2	18	16	17	1.2	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/2	1.6*	0.49	1.0	0.56	*f*
White Oak Lake at White Oak Dam (WCK 1.0)						
Field measurements						
Dissolved oxygen (ppm)	12/12	12	3.8	7.2	0.63	*f*
pH (SU)	12/12	8.0	6.2	*f*	*f*	*f*
Temperature (°C)	12/12	30	6.2	17	2.4	*f*
Metals (mg/L)						
Aluminum, total	12/12	1.6	0.33	0.97	0.13	*f*
Barium, total	12/12	0.060	0.040	0.046	0.0015	*f*
Calcium, total	12/12	59	36	47	1.5	*f*
Iron, total	12/12	1.4	0.33	0.81	0.095	*f*
Magnesium, total	12/12	12	6.7	9.7	0.48	*f*
Manganese, total	12/12	0.29	0.058	0.15	0.018	*f*
Potassium, total	10/12	3.1	<2.0	~2.6	0.10	*f*
Sodium, total	12/12	45	8.6	22	3.3	*f*
Radionuclides (pCi/L)[g]						
^{137}Cs	12/12	240*	3.6*	44*	19	120
Gross alpha	9/12	13*	0.21	4.7*	1.0	*f*
Gross beta	12/12	500*	130*	320*	30	*f*
^{3}H	12/12	120,000*	20,000*	72,000*	8,700	80,000
^{40}K	4/12	61*	–25	10	7.9	280
Total rad Sr	12/12	170*	57*	110*	9.2	40
Total uranium	3/3	5.2*	2.1*	3.2*	1.0	20
$^{233/234}$U	4/4	4.3*	2.4*	3.8*	0.47	*f*
^{234}U	3/3	3.0*	0.92*	1.8	0.62	20
^{238}U	7/7	1.2*	0.56*	0.89*	0.093	24
White Oak Creek downstream from ORNL (WCK 2.6)						
Field measurements						
Dissolved oxygen (ppm)	6/6	11	6.8	8.7	0.68	*f*
pH (SU)	6/6	8.6	6.0	*f*	*f*	*f*
Temperature (°C)	6/6	23	8.1	16	2.5	*f*
Radionuclides (pCi/L)[g]						
^{137}Cs	6/6	260*	34*	79*	37	120
Gross alpha	5/6	7.5*	0.32	4.0*	1.1	*f*
Gross beta	6/6	480*	120*	230*	53	*f*
^{3}H	6/6	59,000*	4,300*	31,000*	8,700	80,000
^{40}K	3/6	220*	–51	47	39	280

Table C.3 (continued)

Parameter	N det/N total	Concentration				TWQC[e]
		Max[b]	Min[b]	Av[c]	Standard error[d]	
Total rad Sr	6/6	98*	28*	65*	12	40
Total uranium	2/2	3.5*	2.9*	3.2*	0.30	20
$^{233/234}U$	2/2	3.9*	1.6*	2.8	1.2	*f*
^{234}U	2/2	1.8*	1.8*	1.8	0	20
^{238}U	4/4	1.7*	0.41*	0.90*	0.30	24
White Oak Creek upstream from ORNL (WCK 6.8)						
Field measurements						
Dissolved oxygen (ppm)	4/4	12	7.5	9.4	0.82	*f*
pH	4/4	7.3	6.4	*f*	*f*	*f*
Temperature (°C)	4/4	18	9.4	14	1.7	*f*
Radionuclides (pCi/L)[g]						
Gross alpha	1/4	0.81*	–0.29	0.38	0.24	*f*
^{3}H	1/4	280*	–120	25	89	80,000

[a]All values were included in the calculations. Only parameters that have one or more samples detected are listed in the table. The sampling and analysis plan contains a complete list of analyses per*f*ormed.

[b]Pre*f*ix "<" indicates the value for a parameter (excluding organics) was not quantifiable at the analytical detection limit.

[c]A tilde (~) indicates that estimated values and/or detection limits were used in the calculation.

[d]Standard error of the mean.

[e]Tennessee General Water Quality Criteria for Recreation and Domestic Use, as amended (CRK 16, CRK 23, CRK 32, CRK 58, CRK 66, CRK 70) or Tennessee General Water Quality Criteria for Freshwater Fish and aquatic Li*f*e, as amended (BCK 0.6, EFK 0.1, EFK 5.4, MEK 0.2, WCK 1.0, WCK 2.6, WCK 6.8). 4% of DOE DCG used *f*or radionuclides, where applicable.

[f]Not applicable.

[g]Individual and average radionuclide concentrations significantly greater than zero are identified by an *. Detected radionuclides are those detected above MDA.